

File Report

February, 1962

BLISTER RUST RECONNAISSANCE IN ONTARIO

1961

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ONTARIO DEPARTMENT OF LANDS AND FORESTS

Research Branch

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Parry Sound	-	1) Smoky Creek Plantation 2) Boulter Township (Natural regeneration)
Algonquin	-	Bridge Dam, Bonnechere River
Swastika	-	Wendigo Lake
Tweed	-	Burnt Bridge Block

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Preface

During 1961 rust conditions in pine were investigated under the regular blister rust survey program, at the following localities in Ontario:

- 1) Smoky Creek Plantation, Parry Sound District. (Young timber)¹⁾
- 2) Boulter Township, Parry Sound District. (Natural regeneration)¹⁾
- 3) Bridge Dam, Bonnechere River, Guthrie Township, Algonquin District. (Young timber).
- 4) Wendigo Lake, Swastika District. (Young timber with some natural regeneration).

As part of a training program, in which Forest Biology Rangers participated, surveys were also made in young timber and natural regeneration in the Burnt Bridge Block, Tweed District. A preliminary report was made following field work.

Items 1, 2, and 3 were periodic examinations, - No. 2 for the third time. Item 4, (Swastika), was a first examination in this northern District.

Results of the surveys, in tabular form, with comment, are reported herewith.

It is becoming increasingly clear that a reorientation and modification of survey work, to meet changing needs, is called for. The purpose of reconnaissance survey is essentially to observe and document the course of epidemic, through periodic examination and record of disease conditions in various parts of the Province.

¹⁾A preliminary synopsis "Blister rust reconnaissance survey, 1961. Localities in Parry Sound and Pembroke Districts. July, 1961" has been distributed.

That need remains, especially in western and northern areas, for which we have few data. There, disease introduction was comparatively recent, and in the north, except very locally, development has been slow, on account of present scarcity or absence of pine. Under such circumstances regular periodic examinations are called for, as a basis for interpretation and prognosis.

In more southerly parts, however, the original object of survey may have been attained, in whole or in part, - often at least to a useful degree, - in showing the development of infection and damage in forest stands under the conditions extant. Of these, the most important perhaps, is the circumstance that, except in the case of trees in stands of reproduction or sapling size, none has been exposed to any infection until half-grown, or more. Thus to make the data already in hand most serviceable, a suitable extrapolation should be devised.

While reconnaissance survey should be continued as required and as feasible, most work in Southern Ontario should be oriented more directly, towards the service of management; that is to say, towards determining: 1) the merits of establishing and maintaining white pine as an important stand component; 2) salvage operations; 3) the feasibility of blister rust control.

Such surveys would naturally have reference to precisely defined areas; and with some obvious exceptions, would be concerned, mainly, with regeneration and young growth to small pole size.

New standards and methods of work would be called for.

In the Reports which follow, data are assembled uniformly under Table headings:

Table 1: "Incidence of infection in (stand)". This is a classified stock table, in which all white pines on a measured area (plot or strip), are placed in categories as follows: Living; living rusted; rust-killed; dead (not rusted); trunk cankered; branch cankered (not trunk cankered).

Table 2: "Stand per acre and rate of infection percent." This table, derived from Table 1, groups the trees of various categories into two DBH (or height) classes, (large and small); and expresses the stocking on a per acre and percentage basis. When available, infection and mortality rates from earlier years are entered.

Table 3: This table gives the numbers and proportions of all trunk and branch cankers, and the rates of occurrence per acre and per tree.

Table 4: A frequency table of trees by number of cankers borne.

Table 5: Tree ages from increment cores.

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Blister Rust Reconnaissance Survey 1961

District - Parry Sound

1. Smoky Creek Plantation

Smoky Creek Plantation, on Pickerel River, some six miles east of Lost Channel, was set out in 1928. The original stocking, with white pine from St. Williams, was estimated at 634 per acre over the 134 acres involved.

One of the earliest plantations on Crown land in pre-Cambrian country, Smoky Creek has high value as a reference station for the observation of blister rust development. It was selected for survey in 1953,¹⁾ and was subsequently examined in the current year (1961).

The history of rust occurrence in this vicinity may be briefly reviewed. In 1928 rust was unknown on native pine; but in that year and in 1929 rusted Ribes was found at several stations south of the French River. Sporadic infection of pine doubtless followed. In 1939,²⁾ a systematic survey of native pine stands along the Pickerel River and Lost Channel, disclosed a rate of infection of 4.9 percent, with no mortality. Thus it may be assumed that the plantation has been exposed to rusting almost, if not quite, from the beginning, - some 33 years to date (1961).

1) Blister rust damage in Smoky Creek plantation, Pickerel River, Parry Sound, 1928-'53. In: Blister rust reconnaissance in Ontario, 1953. Mss. Rept., Lab. For. Path. Maple, Ont.

2) White pine blister rust in Ontario. The present status of the disease at localities in Haliburton, Nipissing, and Parry Sound, 1939. Mss. Rept. Dept. Lands & Forests, Ont.

Tables 1-4 following are based on the examination of 1034 pines, on a sample strip of 1.88 acres taken in the ~~summer~~ of 1961. Table 1 shows the number of trees, from one to fourteen inches D.B.H., in various categories. The modal diameter of live stems was 4 inches.

In Table 2, values are expressed on a per acre basis. Trees were grouped in two diameter classes, "small" and "large", the latter including dominants and co-dominants, - normally selected as crop trees. Rates of infection and mortality are given, with values for 1953 entered for comparison.

The number of rust-free trees was 371 per acre, 306 of which were six inches or less, and 66 seven inches or more, in diameter. Live rusted trees numbered 55 per acre, of which 25 were "large" size. Trunk cankered trees numbered 55, and branch cankered trees (not trunk cankered) only 4 per acre, - a remarkably low figure. Recognizable rust-killed trees amounted to 49 per acre, of which only three were over six inches. Some small rust-killed trees were undoubtedly missed. Mortality would appear to be about ten or twelve percent numerically.

It is of interest to compare results in 1961 with those of 1953. Maximum diameter has increased from eight to fourteen inches; and the mode from two to four inches. The number of live rust-free trees appear to have declined about ten percent. On the other hand, the rate of infection among live trees has dropped from 19.3 ± 3.0

to 12.8 ± 4.9 percent, ³⁾ - a difference which can be accounted for only in part by the death of rusted trees. (Rust-killed rate has risen from six to ten percent). It is clear that new infections have been few, - a conclusion which is confirmed by the remarkable decline, and very low present rate of branch canker. This is reflected, of course, in Table 3, showing the number of cankers per acre for 1961 and '53.

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Maple, Ontario.
February, 1962.

3) Standard deviations were calculated from ten and eight samples of 100 live trees each, in 1953 and 1961 respectively.

TABLE 1

District: Parry Sound
 Locality: Smoky Creek Plantation, 1961
 Strip: 0.2 x 94 chs = 1.88 ac.

DBH	<u>Incidence of Infection in Plantation</u>														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Total No. Pw	169	191	152	159	112	76	60	45	38	19	11	1		1	1034
No. living Pw	86	119	122	138	97	70	60	42	36	19	11	1		1	802
No. living Pw not rusted	86	113	115	126	81	54	49	25	25	17	7			1	699
No. living Pw rusted		6	7	12	16	16	11	17	11	2	4	1			103
No. Pw rust-killed	7	19	22	19	15	5		3	2						92
No. Pw rusted & rust-killed	7	25	29	31	31	21	11	20	13	2	4	1			195
No. Pw dead (not rusted)	76	53	8	2		1									140
No. Pw trunk cankered		6	5	12	16	16	10	16	9	2	4				96
No. Pw branch cankered ¹⁾			2				1	1	2			1			7

¹⁾ not trunk cankered

TABLE 2

Stand per Acre and Rate of Infection percent

DBH	<u>No. of Trees, Pw per Acre</u>			<u>Rate of Infection percent</u>		
	1-6"	7"+	Total	Pw 7"+	<u>Pw Total</u>	
					1961	'53
Total No. Pw	457	93	550			
No. living Pw	336	90	426	100	100	
No. living Pw not rusted	306	66	372	73	87	
No. living Pw rusted	30	25	55	27	12.8 ¹⁾	19.3 ²⁾
No. Pw rust-killed	46	3	49	3	10	6
No. Pw rusted & rust-killed	77	27	104	29	20	20
No. Pw dead (not rusted)	75		75			
No. Pw trunk cankered	29	22	51	24	12	11
No. Pw branch cankered ³⁾	1	3	4	3	1	11

1) Standard deviation = 4.9

2) Standard deviation = 3.0

3) Not trunk cankered

TABLE 3

No. of Cankers and Position on Tree

	<u>No.</u>	<u>Percent</u>	<u>Per Acre</u>		<u>Per Tree</u>
			'61	'53	'61
Trunk cankers	107	83	57	56	0.13
Branch cankers	22	17	12	70	0.03
Total	129	100	69	126	0.16

TABLE 4

No. of Trees by Canker-Frequency Classes

<u>No. of Cankers per tree</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>Total</u>
No. of living trees	83	16	2	2	103
No. of cankers	83	32	6	8	129

2. Boulter Township (Natural Regeneration)

The third periodic examination of natural regeneration in Boulter Township was made in the summer of 1961. A preliminary synopsis was issued following field work. Earlier surveys date from 1939¹⁾ and 1952²⁾, when standard data and descriptive accounts of the area were given.

It is to be recalled that following early fires there, scattered seed trees, singly and in groups, remained to seed adjacent grounds in characteristic pattern. Thus, in the early thirties, oval islands of young growth, extending north-easterly from the mother trees, became established. Seeding has been continuous since, though fluctuating in amount from year to year. With thickening growth, and latterly with the gradual removal or death of seed trees, it has become much less effective than at first. Thus until now, stocking has been well maintained, in spite of losses due to blister rust and other causes.

The results of current examination of 1209 trees on eleven 0.1 acre sample plots are given in Tables 1-4 following. Comparative data for 1939 and 1952 are entered in Tables 2 and 3.

- 1) White pine blister rust in Ontario. The present status of the disease at localities in Haliburton, Nipissing and Parry Sound, 1939. Mss. Rept. Ont. Dept. Lands and Forests.
- 2) White pine blister rust in Boulter Township, District of Nipissing. Present conditions and progress from 1939 to 1952. (In Blister rust reconnaissance in Ontario, 1952). Mss. Rept. Lab. For. Path., Maple, Ont.

On account of rapid growth of stock since 1952, trees were tallied in DBH classes, rather than height classes, as formerly. Heights were recorded among data collected for rusted trees only. Diameters now range from one to eleven inches. The mode is still in the lowest class, indicating ingrowth from seedling sizes: Heights ranged from five to forty-five feet (from Table of heights of rusted trees, unpubl.). Here the mode lies between twenty-five and thirty feet; which reflects correlation between incidence of infection and tree size.

Examination of Tables

Tables 1 and 2: Of 924 live white pines per acre, 143 were rusted, a live rate of 15.6 percent.¹⁾(10.3²⁾ in 1952). There were, besides, 109 rust-killed trees, indicating a total infection rate of 24 percent. It is to be noted that among the larger trees (seven inches and up), almost half were rusted; though mortality, as yet, is slight in these sizes, as might be expected. Inspection of periodic infection and mortality shows a steady rise from 1939 to date. The high figure of 49 percent rusted and rust-killed, in trees of large size, is very ominous.

Tables 3 and 4: The number of cankers per acre has increased from 35 in 1939 to 202 in 1961; and the rate per tree from 0.08 to 0.22.

^{1),2)} Standard deviations of 3.9 and 4.5 were calculated from ten 100 tree samples in 1961 and 1952 respectively.

In recent years the number of branch cankers has been increasing rapidly over the number of trunk cankers, although in 1939, when the trees were small, there were four times as many trunk cankers as branch cankers. The number of cankers per acre has increased sixfold and the number per tree, fourfold, in the last 22 years.

TABLE 1

District: Parry Sound
 Locality: Boulter Twp. (Regen.) 1961
 Plots: 11 x 0.1 = 1.1 ac.

Incidence of Infection in Regeneration

DBH	1	2	3	4	5	6	7	8	9	10	11	Total
Total No. Pw	386	260	183	163	107	46	33	16	10	2	2	1209
No. living Pw	294	216	154	147	99	45	31	16	9	2	2	1016
No. living Pw not rusted	281	196	130	116	69	33	17	8	7			858
No. living Pw rusted	13	20	24	31	30	12	14	8	2	2	2	158
No. Pw rust-killed	24	39	28	16	8	1	2		1			119
No. Pw rusted & rust-killed	37	59	52	47	38	12	16	8	3	2	2	277
No. Pw dead not rusted	68	5	1									74
No. Pw trunk cankered	8	8	14	14	16	5	7	2		1	1	76
No. Pw branch cankered ¹⁾	5	12	10	17	14	7	7	6	2	1	1	82

¹⁾ not trunk cankered

TABLE 2

Stand per Acre and Rate of Infection percent

	<u>No. of Trees, Pw; per Acre</u>			<u>Rate of Infection percent</u>			
	<u>1-6"</u>	<u>7"+</u>	<u>Total</u>	<u>Pw 7"+</u>	<u>Pw Total</u>		
					'61	'52	'39
Total No. Pw	1042	57	1099				
No. living Pw	869	55	924	100	100		
No. living Pw not rusted	752	29	781	53	85	90	97
No. living Pw rusted	118	25	143	47	15.6 ¹⁾	10.3 ²⁾	3.4
No. Pw rust-killed	106	3	109	5	10	6	0.7
No. Pw rusted & rust-killed	224	28	252	49	24	15	4
No. Pw dead (not rusted)	67		67				
No. Pw trunk cankered	59	10	69	18	8	7	
No. Pw branch cankered ³⁾	59	15	74	28	8	4	

1) Standard deviation = 3.9

2) Standard deviation = 4.5

3) Not trunk cankered

TABLE 3

No. of Cankers and Position on Tree

	No.	Percent	<u>Per Acre</u>			<u>Per Tree</u>		
			'61	'52	'59	'61	'52	'39
Trunk Cankers	83	37	75	71	28	0.08	0.07	0.07
Branch Cankers	139	63	127	75	7	0.14	0.08	0.02
Total	222	100	202	146	35	0.22	0.15	0.08

TABLE 4

No. of Trees by Canker Frequency Classes

No. of cankers per Tree	1	2	3	4	5	6	7	Total
No. of living trees	111	37	6	3			1	158
No. of cankers	111	74	18	12			7	222

Blister Rust Reconnaissance Survey, 1961District - AlgonquinBridge Dam, Bonnechere River

This locality, on the upper Bonnechere River in Guthrie Township, was selected for survey in 1954¹⁾, when 571 white pines were examined on twenty-two one-tenth acre plots. Subsequently, logging operations disturbed plots 8-14, for which substitute plots were chosen in 1961, to yield an equivalent number of trees. These were located on the south side of the Bonnechere, west of the Hydro transmission line, as shown in Fig. 1.

The results of examination in 1961 are given in Tables 1-5 herewith. Comparable data for 1954 are entered in Tables 2 and 3.

Inspection of the tables indicates little change in disease conditions in the last seven years.

1) Blister rust reconnaissance in Ontario, 1954. Upper Bonnechere River, Guthrie Twp., Algonquin Park. Mss. Rept. Lab. For. Path., Maple, Ontario.

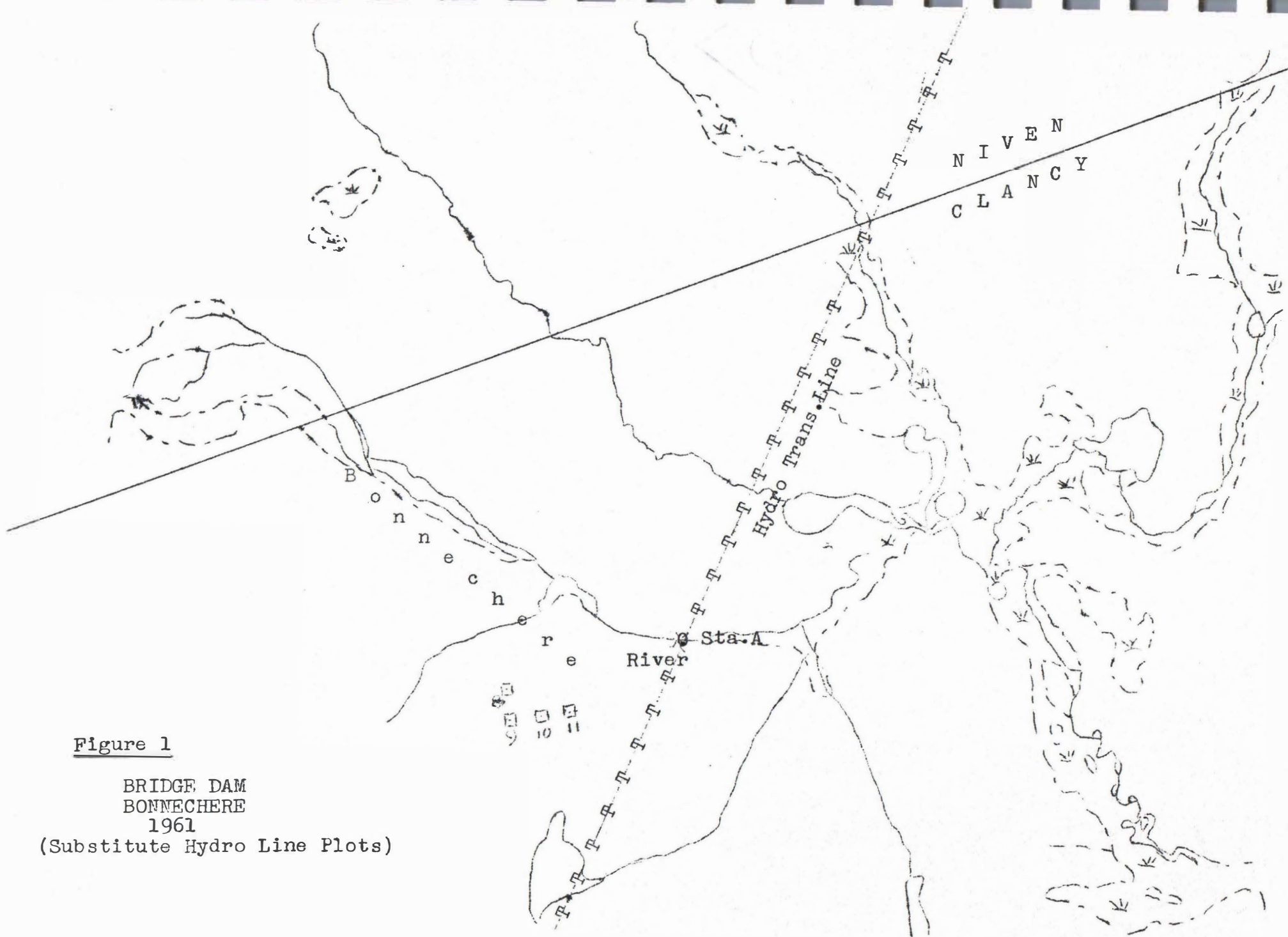


Figure 1

BRIDGE DAM
BONNECHERE
1961
(Substitute Hydro Line Plots)

TABLE 1

District: Pembroke
 Locality: Bridge Dam, Bonnechere 1961
 Plots: 20 x 0.1 ac. = 2.0 ac.

Incidence of Infection in Young Timber

DBH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Total No. Pw	4	51	90	103	114	65	99	61	96	29	54	21	13	10	4		814
No. living Pw		11	43	67	73	54	84	55	84	28	49	20	13	10	4		595
No. living Pw not rusted		11	43	62	70	50	72	46	66	20	35	16	9	8	3		511
No. living Pw rusted					5	3	4	12	9	18	8	14	4	4	2	1	84
No. Pw rust-killed				2	2	3	1	3	2	4		3	1				21
No. Pw rusted & rust-killed				2	7	6	5	15	11	22	8	17	5	4	2	1	105
No. Pw dead not rusted	4	40	45	34	38	10	12	4	8	1	2						198
No. Pw trunk cankered					1	1	1	4	3	8	4	9	2		1	1	35
No. Pw branch cankered ¹⁾					4	2	3	8	6	10	4	5	2	4	1		49

¹⁾Not trunk cankered

TABLE 2

Stand per Acre and Rate of Infection percent

	<u>No. of Trees, Pw per Acre</u>			<u>Rate of Infection percent</u>		
	2-6"	7"+	Total	<u>Pw 7"+</u>	<u>Pw Total</u>	
					¹ 61	¹ 54
Total No. Pw	181	226	407			
No. living Pw	97	200	297	100		
No. living Pw not rusted	93	162	205	81	86	87
No. living Pw rusted	4	38	42	19	14.1 ¹⁾	13.4 ²⁾
No. Pw rust-killed	3	7	10	3	3	5
No. Pw rusted & rust-killed	7	45	52	21	17	18
No. Pw dead, not rusted	80	18	99			
No. Pw trunk cankered	1	16	17	8	6	8
No. Pw branch cankered ³⁾	3	21	24	11	8	5

¹⁾Standard deviation = 3.4

²⁾Standard deviation = 3.2

³⁾Not trunk cankered

TABLE 3

No. of Cankers and Position on Tree

	No.	Percent	<u>Per Acre</u>		<u>Per Tree</u>	
			'61	'54	'61	'54
Trunk cankers	35	36	17	26	0.06	0.087
Branch cankers	62	64	31	24	0.10	0.077
Total	97	100	48	49	0.16	0.17

TABLE 4

No. of Trees by Canker Frequency Classes

No. of cankers per tree	1	2	3	4	Total
No. of living trees	75	6	2	1	84
No. of cankers	75	12	6	4	97

TABLE 5

Tree Ages from Increment Cores

Date	No.	Sp.	DBH	Ht. to core	Rings Counted	+Est. rings to pith	+Est. yrs. to core	Est. Total Age
26/6/61	P1.6	Pw	14	2'	78	2	5	85
"	P1.8	Pw	12	3'	60	1	6	67
"	-	Pr	16	4'	70	2	5	77
"	-	Pr	13	4'	68	1	5	74

Blister Rust Reconnaissance Survey, 1961District - SwastikaWendigo Lake

In northern Districts, quantitative data on the occurrence of rust on pine and Ribes are very few, and have been collected systematically only in recent years at a few stations. Appreciation of the course of blister rust epidemic in the Province generally calls for knowledge of disease conditions and potential at the perimeter of host ranges. A practical aspect of this matter is evident in the initiation of large planting programs in northern Districts, where the proper place of white pine is problematical. Additional northern stations for periodic observation are required.

This report gives the results of a first examination of a white pine stand at Wendigo Lake, in Bayly Township, Swastika District.¹⁾ The main stand was established about 80 years ago. Scattered individuals, of older, fire-scarred pine, survive. Fire, 30 or 40 years ago, damaged the young timber, and induced regeneration over a part of the area traversed. Thus the stand presents, in part, two age classes, and a few older veterans.

¹⁾ A preliminary account (including Table 1 following) was contained in a report already circulated: "Investigation of certain blister rust conditions. Swastika, Gogama and Soo Forest Districts, Ontario, 1961."

Courses were run between Wendigo and Skeleton Lakes, on which sample strips, 2 chs wide, and 72 chs long, were measured (Fig. 1). All white pines, 4 inches or more in diameter, were examined for rust, - a total of 437 trees, of which 410 were living. The results are given in Tables 1-5 herewith.

Table 1 is a classified stock table of the white pines on 14.4 strip acres. Trees are entered, by one inch diameter classes, under various categories with respect to health.

Table 2, which is derived from Table 1, is expressed on a per acre basis. The trees are grouped in only two diameter classes ("small" and "large"), and percentage rates of infection and mortality are given.

Tables 3 and 4 enumerate and classify all cankers with respect to type and frequency.

Table 5 is a record of ring counts, on increment cores from dominant and co-dominant trees.

An unexpectedly high rate of infection was found, - (18.0 percent overall¹⁾, 23 percent for larger trees). Mortality is low, at 3 percent.

¹⁾ Standard deviation = 4.5, based on four 100 live tree samples.

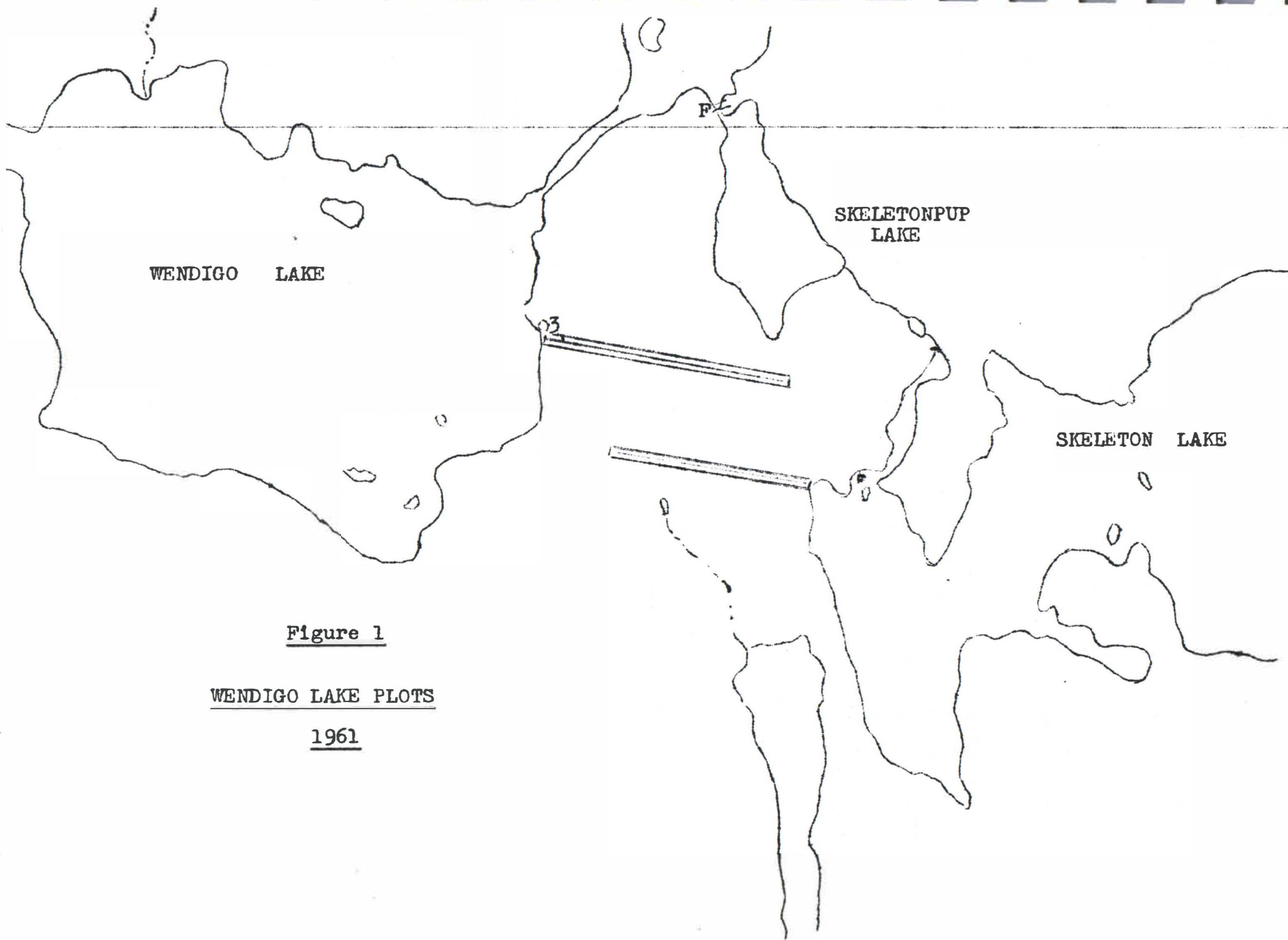


Figure 1

WENDIGO LAKE PLOTS

1961

TABLE 1

District: Swastika
 Locality: Wendigo Lake, 1961
 Strip: 2 x 72 chs = 14.4 ac.

	<u>Incidence of Infection in Young Timber</u>															
DBH	4	5	6	7	8	9	10	11	12	13	14	15	16	<u>Total</u>		
Total No. Pw	65	58	44	40	33	44	44	37	27	23	16	4	2	437		
No. living Pw	59	50	40	38	31	42	43	37	25	23	16	4	2	410		
No. living Pw not rusted	56	45	35	31	24	38	32	28	19	11	12	4	1	336		
No. living Pw rusted	3	5	5	7	7	4	11	9	6	12	4		1	74		
No. Pw rust-killed	3	3	3	1		2								12		
No. Pw rusted & rust-killed	6	8	8	8	7	6	11	9	6	12	4		1	86		
No. Pw dead not rusted	3	5	1	1	2		1		2					15		
No. Pw trunk cankered	2	2	4	4	6	4	8	6	2	7	1	3		49		
No. Pw branch cankered ¹⁾	1	3	1	3	1		3	3	1	5	3		1	25		

¹⁾not trunk cankered

TABLE 2

Stand per Acre and Rate of Infection percent

	<u>No. of Trees, Pw per Acre</u>			<u>Rate of Infection percent</u>	
	4-6"	7"+	Total	<u>Pw 7"+</u>	<u>Pw Total</u>
Total No. Pw	11	19	30		
No. living Pw	10	18	28	100	100
No. living Pw not rusted	9	14	23	77	82
No. living Pw rusted	1	4	5	23	18.0 ¹⁾
No. Pw rust-killed	0.6	0.2	0.8	1	3
No. Pw rusted & rust-killed	2	4	6	24	20
No. Pw dead (not rusted)	0.6	0.4	1.0		
No. Pw trunk cankered	0.6	2.8	3.4	16	12
No. Pw branch cankered ²⁾	0.3	1.4	1.7	8	6

1) Standard deviation = 4.5

2) Not trunk cankered

TABLE 3

No. of Cankers and Position on Tree

	No.	Percent	Per Acre	Per Tree
Trunk Cankers	55	49	3.8	0.13
Branch Cankers	58	51	4.0	0.14
Total	113	100	7.9	0.27

TABLE 4

No. of Trees by Canker Frequency Classes

No. of Cankers per Tree	1	2	3	4	<u>Total</u>
No. of living trees	48	15	9	2	74
No. of cankers	48	30	27	8	113

TABLE 5

Tree Ages from Increment Cores

Date	No.	Sp.	DBH	Ht. to core	Rings counted	+Est. rings to pith	+Est. yrs. to core	Est. Total Age
31/7/61	1	Pr	13	4'	63	2	8	73
"	2	Pw	13	4'	74	1	8	83
"	3	Pw	11	4'	68	3	8	79

Blister Rust Reconnaissance, 1961District - TweedBurnt Bridge Block

The tables following (for young timber and regeneration were prepared from field sheets of practice surveys conducted for and by Forest Biology Rangers, as part of the instruction given at Green Lake, in the spring of 1961.

In the case of young timber, diagnosis of blister rust proved to be unusually difficult in Burnt Bridge Block, on account of the frequency with which, over much of the area, cankers (especially old cankers) had been chewed by rodents. A peak of such activity was reached some years ago. Recent feeding was not exceptionally heavy, and the regeneration showed comparatively little of it.

Working rules (in reconnaissance survey) require that cankers of dubious origin should not be attributed to blister rust. Thus the tendency is to minimize blister rust infection in rodent infested areas. For that reason such areas are ordinarily excluded from tracts surveyed.

In the present instance, a rate of infection in young timber of eleven or twelve percent was determined. This is much less than the rate found at Green Lake and vicinity in earlier years. One suspects a bias imposed by the working rules. To what extent rodent work may inhibit rusting, is not known.

In regeneration, an overall infection rate of seven percent, and a rate of thirteen percent in the larger sizes is about what Green Lake results would lead us to expect.

TABLE 1

District: Tweed
 Locality: Burnt Bridge Block, 1961
 Strip: 0.2 x 140 chs = 2.8 ac.

	<u>Incidence of Infection in Regeneration</u>													
Ht. ft.	2	4	6	8	10	12	14	16	18	20	22	24	26	Total
Total No. Pw	95	116	150	112	61	52	23	11	24	5	6	5	3	663
No. living Pw	86	103	138	100	57	51	23	10	23	5	6	5	2	609
No. living Pw not rusted	83	100	135	92	55	42	20	9	8	4	6	3	1	568
No. living Pw rusted	3	3	3	8	2	9	3	1	5	1		2	1	41
No. Pw rust-killed	5	9	11	12	4	1		1	1					44
No. Pw rusted & rust-killed	8	12	14	20	6	10	3	2	6	1		2	1	85
No. Pw dead (not rusted)	4	4	1							1				10
No. Pw trunk cankered	2	3	2	6	2	5	2		4			2		28
No. Pw branch cankered ¹⁾	1	1	1	2		4	1	1		1		1		13

¹⁾ Not trunk cankered

TABLE 2

Stand per Acre and Rate of Infection percent (Regeneration)

Ht.	<u>No. of Trees, Pw per Acre</u>			<u>Rate of Infection percent</u>	
	2-8 ft.	10'+	Total	Pw 7"+	Pw Total
Total No. Pw	169	68	237		
No. living Pw	152	65	217	100	100
No. living Pw not rusted	146	56	202	87	93
No. living Pw rusted	6	9	15	13	7
No. Pw rust-killed	13	3	16	4	7
No. Pw rusted & rust-killed	19	11	30	16	13
No. Pw dead, not rusted	3	1	4		
No. Pw trunk cankered	5	5	10	8	5
No. Pw branch cankered ¹⁾	2	3	5	4	2

¹⁾ Not trunk cankered

TABLE 3

No. of Cankers and Position on Tree (Regeneration)

	No.	Percent	Per Acre	Per Tree
Trunk cankers	32	63	11.4	0.05
Branch cankers	19	37	6.8	0.03
Total	51	100	18.2	0.08

TABLE 4

No. of Trees by Canker Frequency Classes (Regeneration)

<u>No. of cankers per tree</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>Total</u>
No. of living trees	35	4		2	41
No. of cankers	35	8		8	51

TABLE 1

District: Tweed
 Locality: Burnt Bridge Block, 1961
 Strip: 1 x 88 chs = 8.8 ac.

Incidence of Infection in Young Timber

	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	26	Total
Total No. Pw	34	60	118	59	94	87	137	43	99	38	52	13	28	3	14		3		3		3		888
No. living Pw	22	26	69	33	68	59	108	36	85	37	49	13	28	3	14		3		3		3		659
No. living Pw not rusted	21	23	63	31	63	56	96	30	68	34	41	12	26	3	12		2		1		3		585
No. living Pw rusted	1	3	6	2	5	3	12	6	17	3	8	1	2		2		1		2				74
No. Pw rust-killed			9		6	2	11		5		2												35
No. Pw rusted & rust-killed	1	3	15	2	11	5	23	6	22	3	10	1	2		2		1		2				109
No. Pw dead not rusted	12	34	40	26	20	26	18	7	9	1	1												194
No. Pw trunk cankered	1	3	5	1	4	2	10	6	14	2	6	1	2		2		1		1				61
No. Pw branch cankered ¹⁾			1	1	1	1	2		3	1	2								1				13

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1)
 Not trunk cankered

TABLE 2

Stand per Acre and Rate of Infection percent (Young Timber)

DBH	<u>No. of Trees, Pw per Acre</u>			<u>Rate of Infection percent</u>	
	4-6"	7"+	Total	Pw 7"+	Pw Total
Total No. Pw	24	77	101		
No. living Pw	13	62	75	100	100
No. living Pw, not rusted	12	54	66	88	89
No. living Pw rusted	1	7	18	12	11.2 ¹⁾
No. Pw rust-killed	1	3	4	5	5
No. Pw rusted & rust-killed	2	10	12	16	16
No. Pw dead, not rusted	10	12	22		
No. Pw trunk cankered	1	6	7	10	9
No. Pw branch cankered ²⁾	0.1	1.4	1.5	2	2

¹⁾ Standard deviation = 4.6

²⁾ Not trunk cankered

TABLE 3

No. of Cankers and Position on Tree (Young timber)

	<u>No.</u>	<u>Percent</u>	<u>Per Acre</u>	<u>Per Tree</u>
Trunk cankers	68	74	7.7	0.10
Branch cankers	24	26	2.7	0.04
Total	92	100	10.4	0.14

TABLE 4

No. of Trees by Canker Frequency Classes (Young Timber)

No. of cankers per tree	1	2	3	4	5	Total
No. of living trees	62	8	3		1	74
No. of cankers	62	16	9		5	92

